

LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Sept. 16-20, 2013.



LASER DIPLOMACY



The Lab's expertise in laser research, particularly fusion energy, led to a collaboration with the Czech Republic.

Lawrence Livermore will build a research laser for use near Prague and is getting \$45 million for the effort.

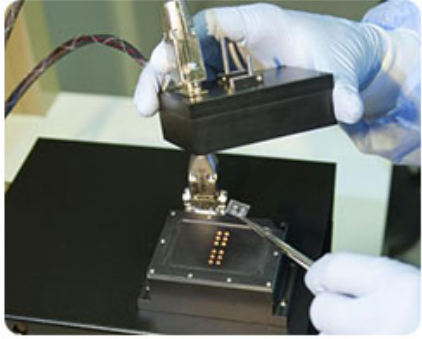
The laser, to be built and tested in Livermore and transported to the Czech Republic in 2016, will be used for scientific testing.

It will be used in the European Union's Extreme Light Infrastructure Beamlines facility, now being built close to Prague. The laser will be used for new work in medical imaging, particle acceleration, quantum physics and also in research related to nuclear security and defense against terrorism.

To read more, see [bizjournals](#).



THREE-MINUTE DIAGNOSIS



A researcher loads a sample into Lawrence Livermore's new fast polymerase chain reaction (PCR) instrument.

Have you ever wanted an instant diagnosis? Instead you often have to agonize over exactly what may be ailing you, because medical tests can take hours, days or weeks to generate results. Patients face this problem frequently as they wait for tests on things like the flu and strep throat.

Help in on the way from Lawrence Livermore and a device that can identify germs in less than three minutes.

Research engineer Elizabeth Wheeler likens it to a photocopy machine: "You make many copies of the DNA. You start with a very small amount, amplify it and make copies and see what is in there. So it allows you to detect early on when there is not a lot of sample."

She says the power of this is the speed. It uses porous material and a thin-film resistive heater, making possible heating and cooling rates of 45 degrees Celsius per second, for a thermal cycle speed of less than 2.5 seconds.

To hear more of the interview, go to wvxu.com.



SHOCKING START FOR LIFE ON EARTH



Did a comet kick-start life on Earth?

Some of the key ingredients for life may have been shocked into existence. A physical simulation of a comet's impact with a planet shows that the conditions are extreme enough to create amino acids within the comet's ice.

Astrobiologists have long wondered whether life or its ingredients could have traveled to Earth riding on the back of a comet or asteroid. Comets are known to contain the organic precursors of amino acids, which are the building blocks of proteins.

An international group of scientists, including Lawrence Livermore researcher Nir Goldman, simulated a comet impact by shock compressing an icy mixture similar to what is found in the cosmic travelers.

What's more, one comet, Wild 2, was recently shown to contain the simplest amino acid, glycine. But how such an amino acid could form there remains a mystery.

To read more, see newscientist.com



FROM WASTEWATER TO GAS



By-products from wastewater treatment may be a viable energy source.

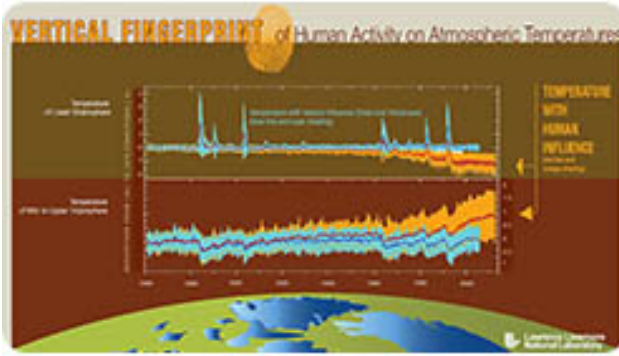
Researchers from Lawrence Livermore and Florida-based Chemergy Inc. plan to demonstrate an innovative technology that converts wastewater biosolids into a hydrogen gas that, in turn, can be used to produce electricity.

The \$1.75 million project will demonstrate an integrated system on a limited industrial scale at the Delta Diablo Sanitation District (DDSD) facility in Antioch, Calif.

"We want to use this demonstration project as a model to encourage the widespread use of biosolids for energy production," said chemist Bob Glass, the Lab's project leader. "Our job is to lend our multi-disciplinary expertise in chemistry, engineering and materials science to model and optimize the efficiency of this new technology."

The demonstration project will be funded jointly by the California Energy Commission and Chemergy, and sponsored by the Bay Area Biosolids to Energy (BAB2E) Coalition.

To read more, go to [CleanTechnica](#).



The [graphic](#) shows how manmade and natural "fingerprints" have caused the stratosphere to cool while the mid- to upper troposphere heats up.

Human influences have directly impacted the latitude/altitude pattern of atmospheric temperature. That is the conclusion of a new report by Lawrence Livermore scientists and six other scientific institutions.

"Human activity has very different effects on the temperature of the upper and lower atmosphere, and a very different fingerprint from purely natural influences," said Benjamin Santer, the lead researcher in the paper, which appeared in "Proceedings of the U.S. National Academy of Sciences."

"Our results provide clear evidence for a discernible human influence on the thermal structure of the atmosphere."

For more see [R&D Magazine](#).

To read the infographic, see the [Web](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send [e-mail](#)

